publication, and in putting calculations in order for that correction of coefficients; and partly on three ramifications or supplements of the theory relating to the effect of the earth's oblateness, the effect of change of position of the ecliptic plane, and the effect of change of excentricity of the earth's orbit, and lunar acceleration. The last of these I have completed to my satisfaction, requiring only an examination of the external factor; the two others are progressing. The Admiralty have assisted me, on estimates, with a moderate grant (of amount named by myself), but much of the expense has been private."

The Report concludes as follows:—"After the details into which I have entered as applying to the present state of the Observatory, and after the remarks which I have made in the two reports last preceding on the question of reduction of printing (which at some fitting time I would willingly again present to the consideration of the Visitors), and the note in the last report on the increase of annual expense, I have only to place before the Visitors, but for no immediate expression of opinion, the impression which frequently weighs upon me as to the ulterior organisation of the Observatory. The determination of places of stars, sun, moon, and planets, was handed down to me from my predecessors; it has in various ways been much extended. The magnetic and meteorological observations (the first originating with myself, the second partly with the movement introduced by the Royal Society and partly by myself) constituted a distinct branch of science, having this property in common with the original astronomical work, that it is incessant and regular. The much later introduction of photographic and spectroscopic astronomy, established at the instance of the Board of Visitors, and carried on with vigour and regularity, has created a third department. All these departments appear at present to be working efficiently and well. But I can easily imagine circumstances which would interfere materially with the successful continuation in one place of this triplicate series of observations. Though I think this possibility of partial failure worthy the contemplation of the Visitors, yet I do not see any necessity for action of any kind at the present time."

INTERCOLONIAL METEOROLOGICAL CONFERENCE AT SYDNEY

A METEOROLOGICAL Conference was held at Sydney in November last, the representatives of the different Colonies being Messrs. James Hector for New Zealand, Charles Todd for South Australia, R. L. J. Ellery for Victoria, and H. C. Russell for New South Wales, the last-named gentleman being chairman. The most cordial unanimity characterised the meeting, which lasted from the 11th to the 14th of the month, and the resolutions arrived at with a view to secure united action in their meteorological investigations and uniformity in the methods and times of observing and forms of publication augur well for the future of meteorology in the Australian Colonies. The whole question of weather telegrams was under anxious consideration. The system in present operation embraces only the Colonies of South Australia, Victoria, New South Wales, and Queensland, but a resolution was passed declaring it desirable to secure the co-operation of the Governments of Western Australia, Tasmania, and New Zealand in the system of inter-colonial weather telegrams. The facts pointed out by Mr. Todd as to the great regularity observed by the atmospheric disturbances in pursuing a course from west to east, and the statement by Dr. Hector that early notices could be sent from Queensland of the origin and progress of the dangerous and suddenly occurring cyclones that cross the northern part of New Zealand, sufficiently attest the practicability of the system of weather warnings and their practical value. For instance, the great storm which wrecked the *Dandenong* in September, 1876, could have been telegraphed in sufficient time to have prevented the great loss of property which took place at the different ports along the coast of New South Wales. We have the greatest pleasure in noting a deliverance by the Conference to the effect that weather telegrams and forecasts shall in all cases depend upon the observations used for general meteorological and climatological statistics. Much emphasis was laid on the establishment of high-level stations with a more special view to the investigation of the winds; and the Conference recommended that there be established in each of the Colonies, upon a high mountain peak, a meteorological observatory for the special study of winds and other meteorological phenomena, the most desirable positions being Mount Lofty, in South Australia, 2,500 feet high; Kiandra, in New South Wales, 4,600 feet; Mount Wellington, in Tasmania, 4,000 feet; Mount Macedon, in Victoria, 3,500 feet; and in New Zealand, Tauhara Taupo, 4,600 feet, and Mount Herbert, 4,000 feet. We hope that the Governments of the different Colonies will vote the small sums which are required to carry out the resolutions of the Conference, the giving practical effect to which will certainly confer substantial advantages on commercial, shipping, and other interests, and contribute materially to a more satisfactory development of the meteorology of this important part of the globe.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—At St. John's College Prof. Liveing has been elected to a foundation fellowship, and Dr. Kennedy, Prof. Sylvester, F.R.S., and Prof. Churchill Babington were elected honorary fellows of the society.

The following awards for proficiency in natural science have been made at St. John's College:—A Foundation Scholarship to Samways; a Proper Sizarship to Love, and Exhibitions to Hart (already scholar), Weldon, Edmunds, Love, T. Roberts. Fleming was awarded one of the Hughes Prizes, given to the two most distinguished third-year students in any branch of study, and a Wright's Prize, with augmentation of the year's emoluments to 100*l*. The Open Exhibition was awarded at Easter to Scott-Taylor (City Middle-class School, Cowper Street), and a second Exhibition to Clementson (Newcastle-under-Lyme).

We understand that Mr. W. J. Lewis has been appointed to perform the duties of Professor of Mineralogy at Cambridge until the close of the year, the period to which the election to the chair has been postponed by the University Commissioners.

SCIENTIFIC SERIALS

Zeitschrift für wissenschaftliche Zoologie, May.—Prof. Zygmunt Kahane, on the anatomy of *Tænia perfoliata*, Göze, as a contribution to the knowledge of the Cestoids, with a plate and a woodcut. The actual facts recorded in the paper were originally laid before the Academy of Sciences of Krakau in May, 1878, and were afterwards published in a somewhat altered form, in the Polish tongue, in their *Proceedings*. The investigations were carried on during the summer and autumn of 1877 in the Zoological Institute at Leipzig, under the supervision of Prof. Leuckart. The history of the species is treated at length, and the paper extends over seventy-seven pages.—Dr. G. Haller, Contribution to a knowledge of the Tyroglyphidæ and their allies, with three plates: describes a new species of Listrophorus (*L. pagenstecheri*): On the genus Homopus, Koch. It is not an independent genus, but the forms are only the larval stages of Dermacarus, which is described as a new parasitic genus; *Tyroglyphus megninii* is described as a new species. There is a sketch of a delineation of the internal anatomy of Tyroglyphus and Dermacarus, and of the egg in these genera.—Prof. Ludwig Stieda, on the structure and development of the *Bursa fabricii*, with five woodcuts.—Dr. Hubert Ludwig, on the primary sand canal in the Crinoids, with some remarks on the comparative anatomy of the Echinoderms in general, with two plates.—Dr. H. Ludwig, new contributions to the anatomy of the Ophiuroids, with three plates.

Journal de Physique, May.—Measurement of the electromotive forces of batteries and electromotive forces of contact of metals, by M. Pellat.—Study of polariser-prisms used in photometric observations, by M. Crova.—On the illumination of electrodes, by M. Colley.—On a new capillary electrometer, by M. Debrun.—To determine with the aid of an articulated system the conjugate points of an optical system, by M. Elie.

Archives des Sciences Physiques et Naturelles, May 15.—On the earths of samarskite, by M. Marignac.—Researches on the condensation of gases on the surface of glass, by M. Chappuis.—The Siemens machine and its application to transmission of force, by M. Achard.—Specific heat, latent heat of fusion, and point of fusion of various refractory metals, by M. Violle.

THE *Reale Istituto Lombardo di Scienze e Lettere, Rendiconti*, vol. xiii., fasc. iv. and v.—The phylloxera considered in rural economy, by S. Cantoni.—Geological notes on the basin of Lake d'Orta, by Dr. Parona.—Health and beneficence; their mutual relations, by Dr. Zucchi.

Fasc. vi. and vii.—On the convenience of forming national nurseries of vines resistant to phylloxera, by S. Trevison.—On the chronological determination of Luganese porphyries, by Prof. Taranelli.—On the fundamental equation in the theory of linear differential equations, by Prof. Casorati.—Representation on punctuated space of some forms of the third species composed of straight lines, by S. Archieri.—On the institution of two new genera of arachnida, by Prof. Pavesi.—Electricity and earthquakes, by S. Serpieri.—List of algæ of the province of Pavia, by Dr. Cattaneo.—Second case of peritoneal tranfusion with good success in an oligocitæmic insane person, by Profs. Colgi and Raggi.—On a transformation of the fundamental equations of hydrodynamics, by Prof. Paci.

THE *Revue Internationale des Sciences biologiques*, May, contains:—E. A. Schaefer, on the development of animals.—Carl Hoberland, infanticide among the ancients and the moderns.—L. Pasteur, on the cholera morbus in fowls; on virulent maladies and on vaccination.—M. Debierre, man before and on the threshhold of history, a study of palæontological facts and of comparative archæology and philology.—Notice of learned societies.—The Academy of Sciences, Paris.—The Academy of Sciences, Amsterdam.—The Anthropological Society of Paris.

Morphologisches Jahrbuch, vol. vi., part 2.—Dr. A. Rauber continues his articles on the evolution of form and its transformations in the development of vertebrata, reaching its second section, on the multiplication of axes, pp. 56, with four plates and seven woodcuts illustrating various early stages of monstrous double-axial structures in various species of Salmo and Gallus.—Dr. J. Brock occupies 112 pages, illustrated by two plates, in endeavouring to establish a satisfactory phylogeny of the dibranchiate cephalopods.—Dr. H. von Thering contributes, on the vertebral column of *Pipa*, to the homology of its individual vertebræ and nerves with those of other anura.—Smaller contributions by Prof. Gegenbaur and by C. Rabl (on Planorbis development).—Reviews of German text-books of anatomy.

Gazetta Chimica Italiana, Fasc. iii. and iv.—On the ulmic matter obtained from sugar by action of acids, by S. Sestini.—On some derivatives of β-chlorobutyric acid, by S. Balbiano.—The diffusion and physiological state of copper in the animal organism, first announced by Bartolomeo Bizio, and elucidated by Prof. Giovanni Bizio.—Notice on the chemical constituents of *Stereocaulon vesuvianum*, by S. Paterno.

Bulletin of the United States Geological and Geographical Survey of the Territories, vol. v. No. 3, November 30, 1879.—J. A. Allen, on the species of the genus Bassaris.—W. H. Patton, the American Bembecidæ tribe Stizini; list of a collection of Aculeate Hymenoptera from North-Western Kansas; Generic arrangement of the bees allied to Melissodes and Anthophora.—George B. Sennett, further notes on the ornithology of the Lower Rio Grande of Texas, made during 1878, with annotations by Dr. E. Coues.—Henry Gannett, additional lists of elevations. Among these is a list of the mountain-peaks forming the Cordilleras of North America and of their passes.—Dr. Morris Gibbs, annotated list of the birds of Michigan.—Dr. Le Conte, the coleoptera of the Alpine Rocky Mountain Regions, Part 2.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 27.—"On the Structure and Development of the Skull in the Batrachia. Part III.," by W. K. Parker, F.R.S. (Abstract.)

Some of the work brought forward in this paper was in hand before the first part was in print. That initial piece of work dealt only with the formation of the skull in the common frog, but it was followed by another which appeared in the *Philosophical Transactions* in 1876, which treated of the skulls of the *common* and of the "aglossal" toads.

Of the latter types only two kinds are known, viz., the nailed toad of the Cape (*Dactylethra*), and the monstrous toad of Surinam (*Pipa*). All the bulk of the Batrachia are included in the sub-group "Opisthoglossa." These have a tongue, and in most cases it is free *behind* and not in front; the "Proteroglossal" Batrachia are very few in number, and the character itself (as Dr. Günther informs me) is not well pronounced.

I have now worked out the skull, in one or more stages, in about a *tithe* of the known species, and in my second paper in both of the aberrant ("aglossal") types; in them this was done in various stages.

I am not aware that there is any "order" of any "class" in the Vertebrata where so large a percentage of species has been, or indeed *need be*, worked out, either in the skull or in any other part of their organisation.

That which calls for it here is the great and unlooked-for polymorphism of the species; I may explain this by saying that the skull, in really important modifications, differs more in the species of some of the genera than it does in the orders of some of the classes. As an instance, it would be no easy thing to find a malacopterous fish differing from an acanthopterous type, in deep-seated essential matters, so much as the common toad does from the other native species, viz., the *Natterjack;* and the common frog has only about half as many cranial elements as the bull-frog of North America.

If the metamorphosis of a single species be worked out exhaustively, it gives a range of structural characters which rises up from a larval creature on the level of the lampreys to a reptilian form not far below the Chelonia, and evidently related (obliquely, not genetically) to that "order."

Moreover, whilst the "opisthoglossa" have larvæ with suctorial mouths, and a *quasi-petromyzine* structure altogether, the larvæ of the "aglossa" need only to be arrested as larvæ and to acquire a dense bony armature to be very close counterparts of the most *bizarre* forms of the ganoids of the "old red sandstone," such as *Pterichthys* and *Coccosteus*.

The Batrachia show some remarkable things in their metamorphosis, both as to the *size* their larvæ obtain and the *time* during which metamorphosis is taking place.

In the bull-frog (*Rana pipiens*) the larvæ attain the length of about 5 inches, and take two or three years for their transformation; they may be hindered in this, and be made to take twice that time. In these the larvæ bear a moderate relation, as to size, to the adult form, which may be 7 inches long, although tailless.

But in a frog from the neotropical region (*Pseudis*) scarcely larger than our native form, the tadpole attains the length of nearly a foot, the tail acquiring a breadth of 4 inches.

As zoologists well know, it is easy to procure *tadpoles* of this species, but very hard to get an adult. I am of opinion that the adult condition is not attained until after many years; and it suggests itself to me that this species may be the not remote descendant of a type which did not finish its *anural* metamorphosis.

On the other hand, some of the neotropical forms have very small tadpoles. *Bufo chilensis*, a large toad, has them about half the size of those of our common native Batrachia, and the newly-metamorphosed individuals are no larger than a house-fly.

But in *Pipa* the small larvæ are thoroughly metamorphosed in the maternal dorsal pouches, and at first only do they show a trace (and only a trace) of branchial tufts.

These tadpoles, which never see the light as such, have wide mouths (not suctorial), and so also have the tadpoles of the other waif of the sub-order "Aglossa," viz., *Dactylethra*. In that kind, however, the larvæ become large, and are a long while undergoing their transformations, which take place in the water, according to rule.

In the skull of the adults much variation is evidently due to the different *size* to which the species attains; some, as the bull-frog, are as large as the common Greek tortoise; others grow scarcely larger than a bluebottle fly. As a rule these small kinds show two kinds of modification: they are apt to retain certain larval characters, and they are apt to acquire generalised characters such as do not normally appear in this group, which is very remarkable for the *fewness* of the parts or elements composing the adult skull.

Some of the large forms, as *Rana pipiens*, have many investing bones in their skull, such as must be looked for again in archaic and extinct types, whilst others, as *Ceratophrys* and *Calyptocephalus*, have a cranial armature that is dense, extended, and almost "ganoid;" this kind of skull, however, is found in middle-sized types also, as in *Pelobates* and *Nototrema*.

In the terminal suctorial mouth of the larva of the Opisthoglossa the mandibular pier and its free "ramus" are carried to the front of the head. After transformation, in the larger kinds, the gape is carried behind the head, as in the crocodile; it can be guessed how much modification such a change as this will necessitate.

But it is evident that a low suctorial fish, such as the *tadpole*